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Field Service Procedure

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Rev: -
Date: 21 February 2003
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700 Mhz WPU - Motherboard Replacement Procedure

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700 Mhz WPU - Motherboard Replacement Procedure

INTRODUCTION

The Motherboard assembly is contained within the WPU assembly which is located in the lower rear section of the machine. Access to this assembly requires removal of the WPU from the machine.

NOTE: This replacement procedure applies only to WPU's with a 700 MHz processor. All Narkomed Series machines starting at serial number 10739 were shipped from DMI with this version processor but should be verified by confirming this information on the WPU cover label.

NOTE: Removed Motherboard assemblies must be returned to DMI. Returning the removed Motherboard assembly requires a Return Materials Authorization (RMA). DMI Technicians should create a Customer RMA in FSS. Distributor personnel should request an RMA from their DMI Customer Service Representative.

Parts List

Note	Qty	Part Number	Description
	1	SE4116727	Motherboard PCB
	5	4106068	Tie Strap
*	3	4117616	Tie Strap Anchor
*	1	4117950	Flash Memory BIOS
	1	4118249	Heat Sink Compound

* An asterisk identifies a component that may or may not be required depending upon WPU vintage and/or previous service history.

INSTALLATION PROCEDURES

1. If WPU is nonfunctional skip to step 2. If functional, determine if the BIOS is at a older revision level 4/18/2000 by perform the following:
   a. If the machine is turned off turn the system power switch to ON and press the Divan Standby key to bypass the Divan Self Test.
   b. Connect a keyboard (P/N 4115133) to the DIN connector on the underside of the NM6000 Series cockpit area as shown in Figure 1.

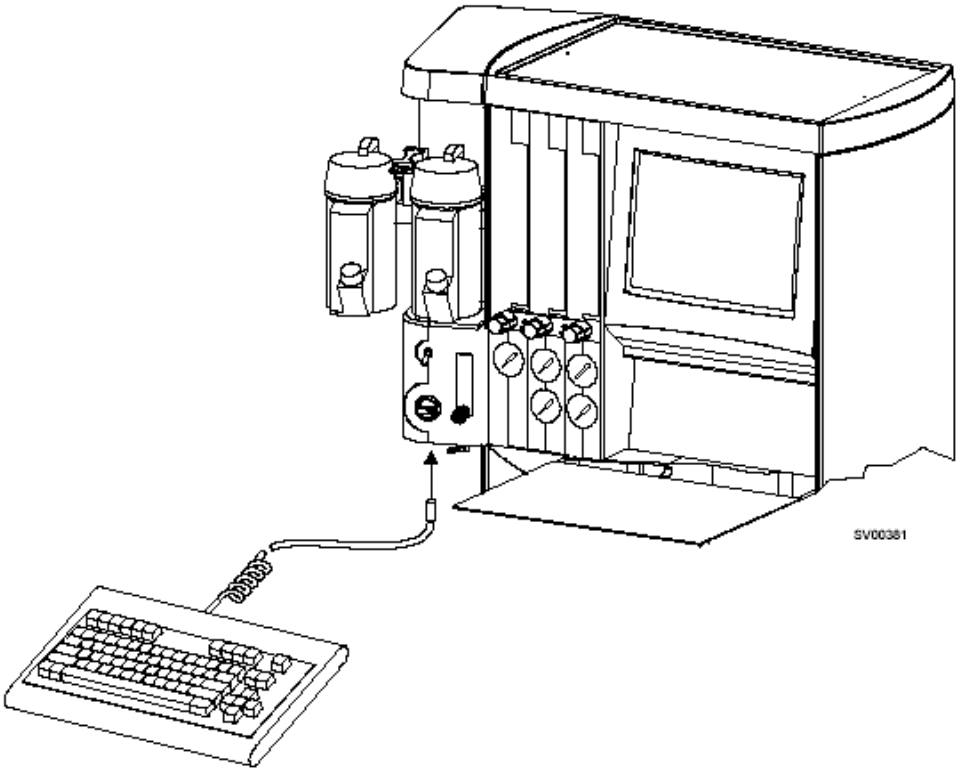

FIGURE 1. Keyboard Connection

   c. On the keyboard connected to the NM6000 Series, press the **ESC** key several times. The following sequence of commands must be performed quickly and in this exact order:
      - Press and hold the **CTRL** key then press the **F9** key, release the **CTRL** key then release the **F9** key.
      - Press and hold the **ALT** key then press the **F9** key release the **ALT** key, then release the **F9** key.

   NOTE: If you are not able to perform the next step, it may be necessary to repeat the previous step several times to effectively disable the keyboard filter. While the filter is active, no key strokes are passed to any application or the operating system. The following steps will not work if the keyboard filter is NOT successfully disabled.

THERE IS NO PHYSICAL INDICATION THAT THE FILTER HAS BEEN DISABLED.

d. Press the Windows key or **Ctrl+Esc**, Select the **Shut down...** item, select **Yes**.

e. At the black BIOS startup screen that includes the 'Energy _EPA Pollution Prevention' logo, press the **Break** key to pause the computer. Identify the BIOS version displayed on the lower left corner of the display. If the version date listed is 4/18/2000, an updated BIOS version is required.

f. Press **Enter** to continue the start up.

2. Turn the System Power switch to STANDBY.
3. Remove AC power from the machine.
4. Wait at least 3.5 minutes, then after the green LED on the Vitalbus HUB has turned off, pull all circuit breakers to their 'out' position.

WARNING: Before servicing, ensure the AC power is removed from the machine and all circuit breakers are disengaged (pulled out). Failure to observe this precaution may cause injury by electric shock.

CAUTION: Use ESD precautions when handling any of the electronic assemblies. These assemblies contain static sensitive components.

5. Close all cylinder valves and remove the cylinders from the yokes.
6. Remove the Vitalbus HUB mounting hardware (do not disassemble the hinge hardware), and swing open the Vitalbus HUB door.
7. Remove the lower left back panel from the machine.
8. If replacing the Motherboard PCB in accordance with NM6K TSB 6017, first verify the WPU part number and serial numbers are listed on the affected devices consignee report. (Contact your service manager if you have not already received this information.) The form contained in this Service Procedure as Attachment 1 must be completed even if the WPU Motherboard is not being replaced. For WPU Motherboards that are not being replaced, indicate N/A for the removed and installed Motherboard PCB serial numbers. Re-install back panels, reserve cylinders, restore AC power, engage circuit breakers and remove keyboards. Fax the 700 Mhz Motherboard PCB Field Correction Report to Ken Horsfield @ 215-721-5784.
9. Disconnect all of the cables at the top rear of the power supply box and move them out of the way.
10. Disconnect all of the cables, except the DC power cable, from the right side (facing the rear of the machine) of the processor assembly.
11. Using a long extension screwdriver, loosen the four captive mounting screws securing the WPU to the machine.
12. Pivot the WPU counter clockwise and then pull the assembly straight back and out of the machine.
13. Record the WPU's part number and serial number onto the Field Correction report. Refer to Attachment 1.
14. Remove the WPU cover.
15. If the outside of the WPU housing is painted white (P/N 4116725 style), continue with the next step. If the exterior of the WPU housing is silver (P/N 4117166, 4117607, 4118005 style), skip to step 21.

INSTALLATION PROCEDURE (continued)

16. Locate the hard drive and bracket assembly and disconnect its Preload Resister assembly from the WPU power supply wire harness and identify this connector on the power supply as "Ω" for future reference. See Figure 2.

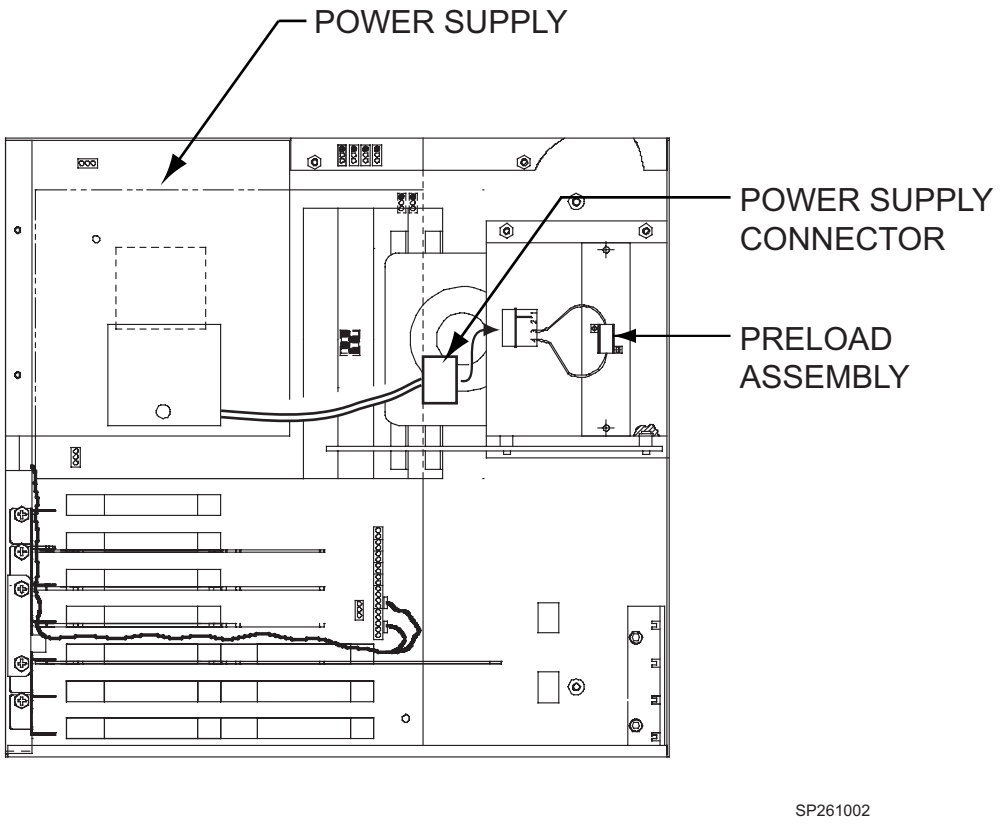

FIGURE 2. WPU White Housing

17. Disconnect the power and data cables from the hard drive assembly and mark connectors as "HD" for future reference.
18. Place an ESD foam pad at least 1-inch thick near the hard drive work area.

    CAUTION: Hard drive assemblies are very delicate. Use extreme care when handling these assemblies. Do not place hard drive assembly on any hard surfaces or impact shock damage may occur.

19. Remove the four screws and lock washers securing the hard drive and bracket assembly to the WPU chassis and gently place the hard drive assembly onto the foam pad.
20. If WPU housing is painted white, skip the next step.

21. Locate the angled bracket and disconnect its Preload assembly from the WPU power supply wire harness and mark this power supply connector as "Ω" for future reference. See Figure 3.

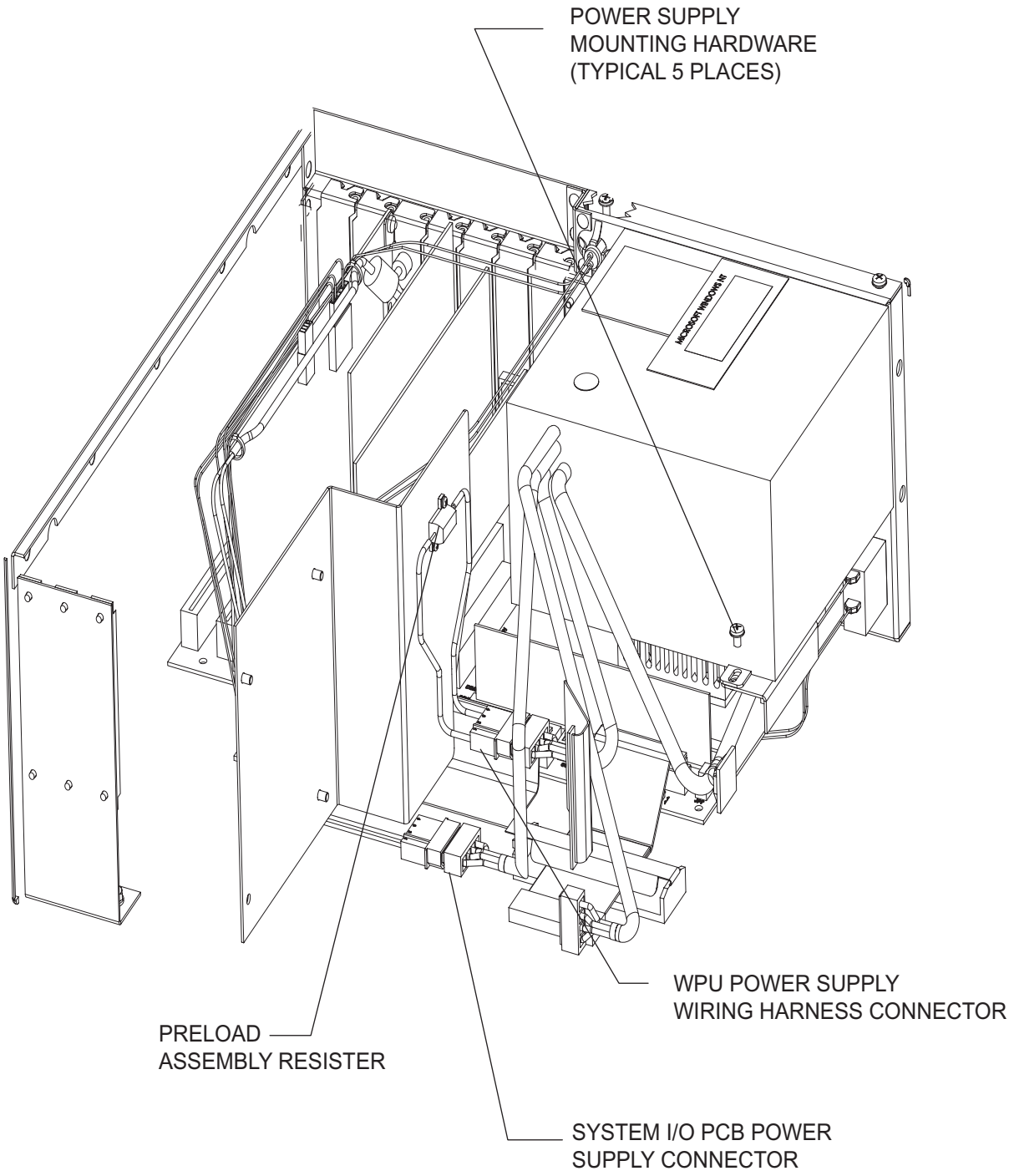

FIGURE 3. Power Supply Connections

INSTALLATION PROCEDURE (continued)

22. Remove the angled bracket from the hard drive module.
23. Remove the WPU power filter mounting bracket from the WPU chassis.
24. Remove the hardware securing the WPU Power supply. There are four screws and lock washers mounted externally near the WPU Power Supply fan and one screw, lock washer and hex nut internally at the chassis. Lay the WPU Power Supply onto the top corner of the WPU chassis and away from the Motherboard PCB.
25. Note the orientation and locations of the Flash Memory BIOS and each PCB that is referenced in Figure 4.

LEGEND	
1	NOT USED
2	NOT USED
3	SYSTEM I/O PCB
4	NOT USED
5	FLASH MEMORY BIOS
6	AUDIO PCI PCB
7	VIDEO PCB
8	EITHER-NET PCB
9	NOT USED

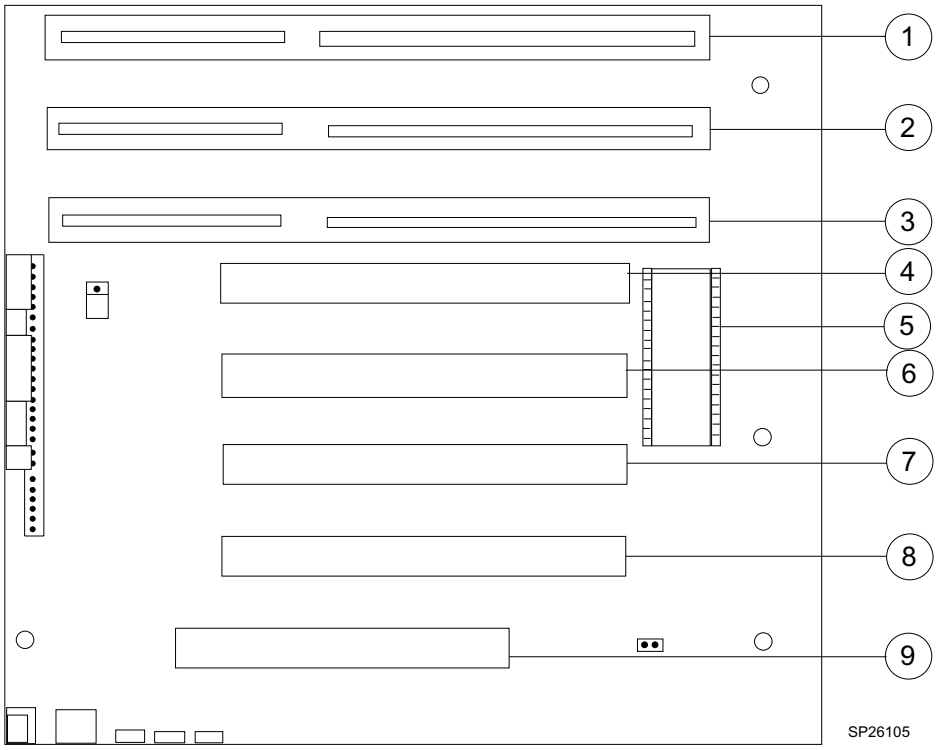

FIGURE 4. Daughter PCBs And BIOS Locations.

26. Remove all hardware securing the PCB card stakes to the chassis.
27. Disconnect the power cable from the System I/O PCB and identify this power supply connector as “I/O” for future reference. Carefully cut the tie straps securing the cable bundled to the top of this assembly and then disconnect the cable at Sys. I/O PCB - J1. See Figure 3 and Figure 4.
28. Carefully remove the System I/O PCB (3), Ethernet PCB (8), Video PCB (7), and Audio PCB (6) from the mother PCB. Refer to Figure 4 for item number locations.

29. Remove the cables from the Motherboard 25 pin connector located at J14. See Figure 5.

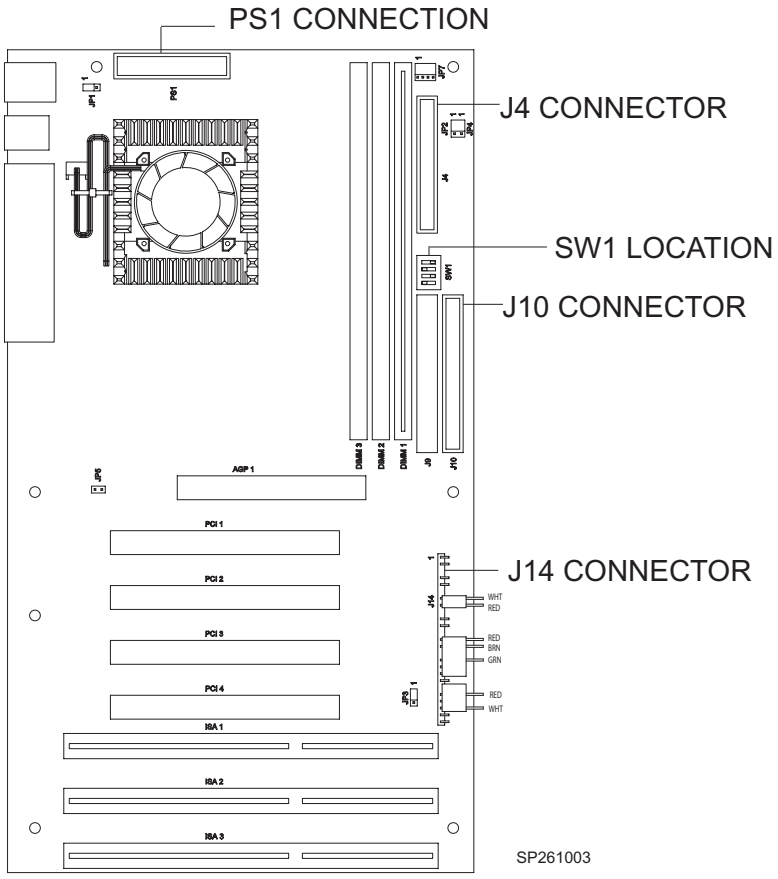

FIGURE 5. Motherboard Connector Locations

30. Remove the main power supply cable from the Motherboard at location PS1.
31. Eject the RAM module(s) from the Motherboard by pressing down on each of their release clips.
32. Disconnect the IDE cables from the Motherboard at J4 and J10. See Figure 5.
33. Remove the hardware securing the Motherboard to the WPU chassis. Then carefully remove the assembly and place it on a suitable work area.
34. Disconnect the CPU Fan power cable from the Motherboard.

INSTALLATION PROCEDURE (continued)

35. Unlatch the CPU Fan retaining clip and remove it from the Motherboard. Place the fan on the work area with the blades down. Refer to Figure 6 for retaining clip location.
36. Unlatch the CPU retaining lever and rotate it to the 12:00 position. Remove the CPU from the Motherboard and place it on the work area with its pins down.
37. If the current Flash Memory BIOS prom label is identified as 6/13/00 or it was previously verified to be at this revision, remove it from U15 on the Motherboard by using an IC removal tool that is capable of removing a 32 pin IC.
38. Record the removed Motherboard serial number on the service and field correction reports. Properly package the assembly for return to DrägerService using the packaging from the replacement Motherboard.

    NOTE: The Motherboard serial number is 9-digits and is located on the outside edge of the ISA 3 socket.

    NOTE: Removed Motherboard assemblies must be returned to DMI. Returning the removed Motherboard assembly requires a Return Materials Authorization (RMA). DMI Technicians should create a Customer RMA in FSS. Distributor personnel should request an RMA from their DMI Customer Service Representative.
39. Record the replacement Motherboard's serial number on the service and field correction reports. Refer to Attachment 1.
40. Install Flash Memory BIOS version 6/13/00 (P/N 4117950) into the Motherboard socket at U15 as follows.
    a. Align the new Flash Memory BIOS with the dimple in the IC oriented toward the corresponding notch in the IC socket then using an IC insertion tool that is capable of inserting a 32 pin IC, carefully insert the Flash Memory BIOS into the socket at location U15.
    b. Examine the Flash Memory BIOS to be certain that the IC is completely seated and none of the IC pins are damaged or improperly inserted.
41. Open the replacement Motherboard's CPU retaining lever and orient the CPU with the reference triangle pointed towards the Parallel port. Insert the CPU pins into the Motherboard socket and secure it by rotating the retaining lever towards the socket frame and lock it into place.
42. Using lint free cloth, wipe away all existing heat sink compound.
43. Apply a thin, fresh coating of heat sink compound (P/N 4118249) approximately 3/8" in diameter to the center area of the CPU.

44. Orient the CPU Fan with the power cable routed towards the Parallel port. Slide the retaining clip hook under the larger retaining wing on one side and secure it by pushing the lever under the larger wing on the other side. See Figure 6.

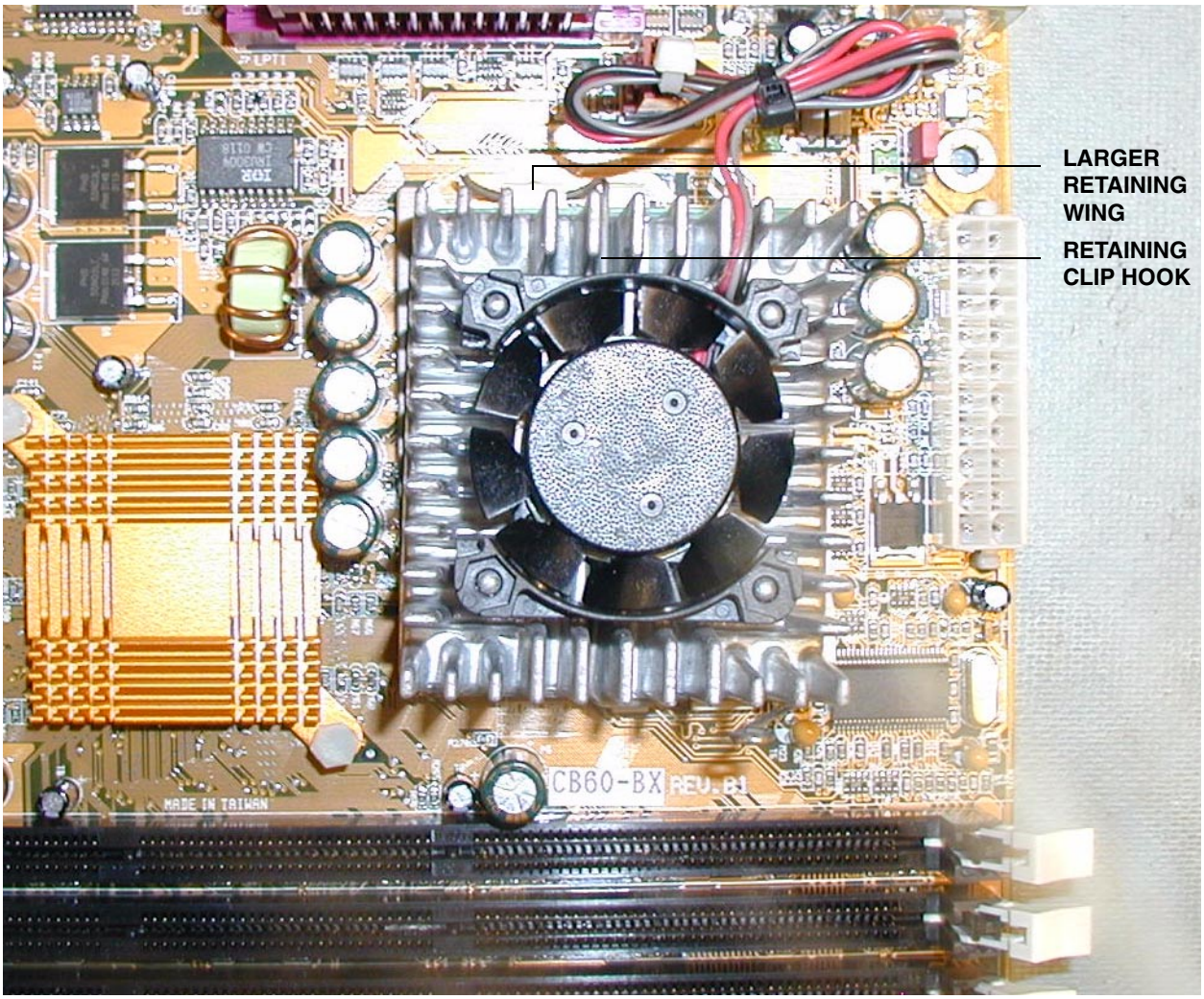

FIGURE 6. Fan Mounting Configuration

45. Orient the CPU Fan power cable keyway to the corresponding keyway on the Motherboard and connect the cable. Dress the power cable away from the CPU Fan and secure it with a tie strap (P/N 4106068).
46. Configure the Motherboard dip switches at location SW1 to 1 & 3 to the ON position and 2 & 4 to the OFF position. Refer to Figure 5.
47. Carefully slide the Motherboard into the chassis and orient its corresponding port connectors under the USB spring clips and nestled to the right of the Mouse and Keyboard spring clips. Secure the Motherboard to the chassis by reusing the hardware previously removed.
48. Attach the unused IDE cable to the single port on the Motherboard at J4 labeled FDD.

INSTALLATION PROCEDURE (continued)

49. Attach the end connector of the IDE cable from the hard drive (or the cable marked "HD"), to the Primary Motherboard connector.
50. Release the Motherboard RAM retaining clips at DIMM1 then insert the RAM module into position with the notches aligned with the corresponding ribs on the Motherboard socket. Ensure that it is seated vertically and horizontally in its socket, then apply firm, even pressure until the retaining clips snap into place. Verify that it is properly clipped in place by gently pulling and making sure it does not retract from the Motherboard. If applicable, reinstall the additional RAM Module at DIMM2 in this manner. See Figure 5 for RAM retaining clip locations.
51. Attach the main power supply cable to the Motherboard connector labeled PS1 and ensure that it is routed below the chassis mount for the power supply. If the WPU housing is painted white, install a tie strap anchor (P/N 4117616) in this location and secure this cable to the anchor with tie strap (P/N 4106068).
52. Attach the cable connections to the Motherboard at J14 per the table in Figure 7 and Figure 5. Pins not listed in Figure 7 are not populated.

Item	Switch		System I/O - Speaker Reset			Power LED	
Pin Location	7	8	13	14	16	21	23
Wire Color	WHT	RED	RED	BRN	GRN	RED	WHT

FIGURE 7. J14 Motherboard Connections

53. If not already present install tie strap anchors (P/N 4117616) as shown and secure the cables to the anchors with tie straps (P/N 4106068). Refer Figure 8.

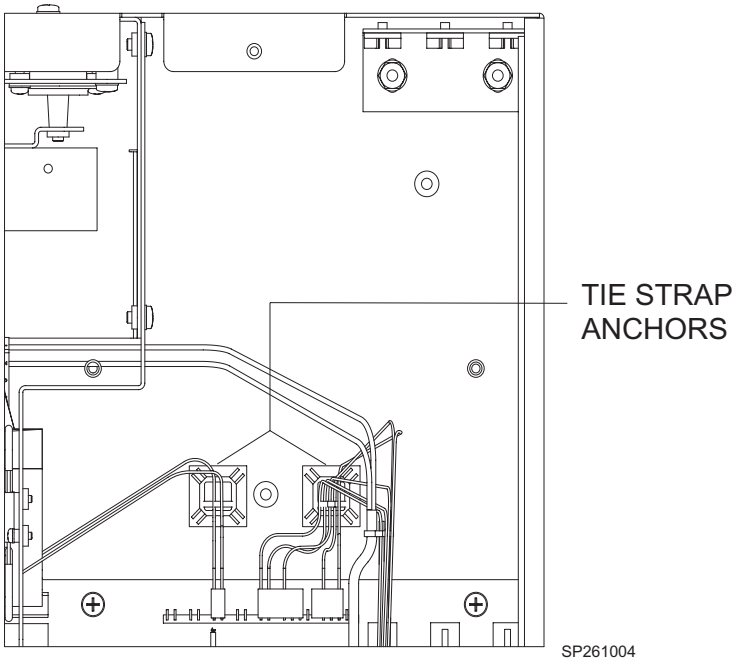

FIGURE 8. Tie Strap Anchor Locations

54. Install the System I/O PCB into the Motherboard slot identified as item number (3) on Figure 4.
55. Connect the System I/O PCB power cable to the Power Supply power cable connector marked “I/O”. Bundle the Sys. I/O – Speaker Reset cable and route the LED Power cable over the System I/O power cable then secure this cluster of wires to the top of this assembly with two tie straps (P/N 4106068).
56. Install the Audio PCB into the Motherboard slot identified as item number (6) in Figure 4.

CAUTION: Tighten the screw closest to the Audio PCB first to reduce the possibility of stripping the chassis threads. Do NOT over tighten.

INSTALLATION PROCEDURE (continued)

57. If applicable, orient the System I/O Clamp as shown in Figure 9 and straddle it over the System I/O PCB. Secure the System I/O PCB and Audio PCB and blank card stake, if applicable, by reusing the hardware previously removed.

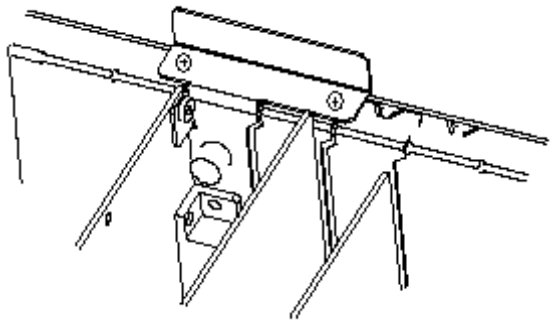

FIGURE 9. System I/O PCB Clamp

58. Install the Video PCB into the Motherboard slot identified as item number (7) in Figure 4 and the Ethernet PCB into the Motherboard PCB slot identified as item number (8) in Figure 4. Secure the PCB's by reusing the hardware previously removed.
59. If the outside of the WPU housing is painted white, (P/N 4116725 style) continue with the next step. If the exterior of the WPU housing is silver (P/N 4117166, 4117607, 4118005 style) skip to step 63.
60. Reconnect IDE data cable to the hard drive assembly.
61. Reconnect the Power Supply connector marked "HD" to hard drive assembly.
62. Carefully install the hard drive module assembly and secure it to the floor of the WPU chassis by reusing the four screws and lock washers. Skip the next step.
63. Install the angle bracket.
64. Reconnect the Power Supply connector marked "Ω" to the Preload resistor.
65. Route the Power Supply filter and power cable through the WPU chassis opening then mount the Power Supply to the chassis by reusing the four screws and lock washers mounted externally near the WPU Power Supply fan and one screw, lock washer and hex nut internally at the chassis.
66. Secure the WPU power filter mounting bracket to the side of the WPU chassis.
67. Install the WPU cover.
68. Slide the WPU assembly into place and secure it with the captive mounting screws.
69. Reconnect all of WPU cables that were previously disconnected and tighten each cable retainer twice to ensure they are secure.
70. If applicable, reinstall the Keylok to the WPU Parallel Printer Port and tighten both retainers twice to ensure they are secure.
71. Reconnect all of the power supply cables that were previously disconnected and tighten the thumb screws retainers at J7 twice to ensure it is secure.
72. Reinstall the back panel on the machine.

73. When re-attaching the 2-pin wire harness to the Vitalbus Hub at J13, verify for proper orientation. From the header connector, the wires must route to the right as shown in Figure 10 with the brown wire above the black wire.

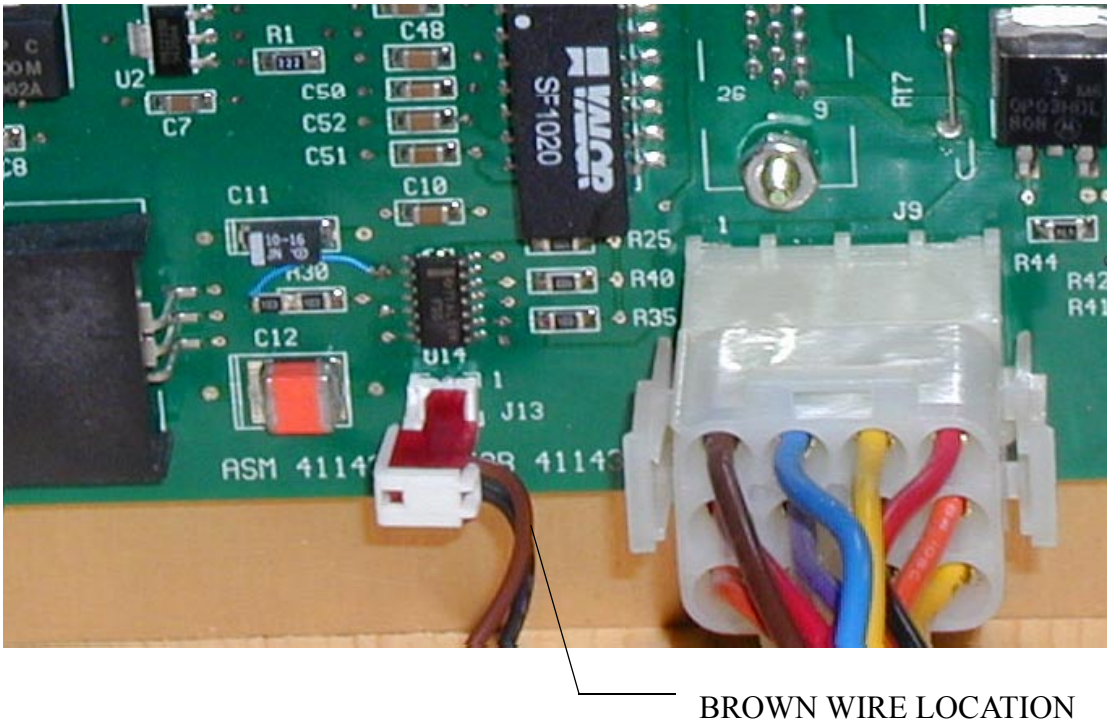

FIGURE 10. Connector Orientation

74. Close the communication HUB panel and reconnect any cables that were previously disconnected.

INSTALLATION PROCEDURE (continued)

75. Route the power cord's strain relief with a loop in a clockwise direction. The retaining clip shall be located 16.5 ±0.25 inches (5.25 inch diameter loop approx.) from the cord end and secured to the Vitalbus HUB door using the mounting hole directly above the power cord socket as shown in Power Cord Routing Figure 11.

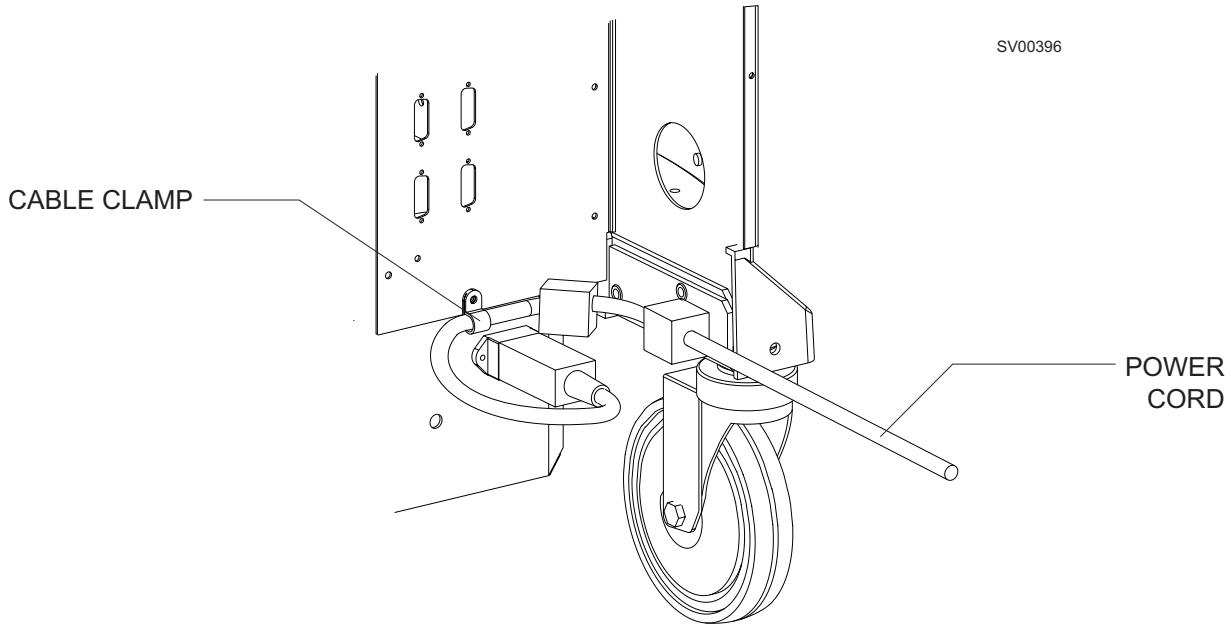

FIGURE 11. Power Cord Routing

76. Reinstall the cylinders in their yokes.
77. Reconnect the pipeline supplies.
78. Enable the circuit breakers and reconnect AC power to the machine.

79. With the System Power switch at STANDBY, connect a keyboard to the DIN connector on the underside of the NM6000 Series cockpit as shown in Figure 12.

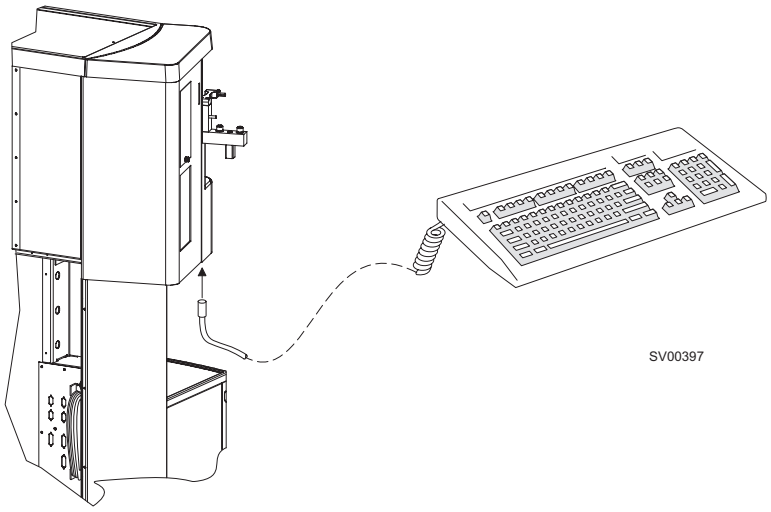

FIGURE 12. Keyboard Connections

80. Press and hold <DEL> on the keyboard and turn the System Power switch to ON. Release the <DEL> key when the BIOS screen appears.

    NOTE: If system does not power up, toggle the processor's power switch.

81. Setup the system BIOS as follows:

```
Standard CMOS Setup
                    System Date:                <current date>
                    System Time:                <current time>
                    Primary IDE Master:         Auto
                    Primary IDE slave:          None
                    Secondary IDE Master:       None
                    Secondary IDE Slave:        None
                    Drive A:                    None
                    Drive B:                    None
                    Video:                      EGA/VGA
                    Halt On:                    All, But Keyboard


BIOS Features Setup
                    Virus Warning:              Disabled
                    CPU L1 Cache:               Enabled
                    CPU L2 Cache:               Enabled
                    CPU L2 Cache ECC Checking:  Enabled
                    Quick Power on Self Test:   Disabled
                    Boot Sequence:              C Only
                    Swap Floppy Drive:          Disabled
                    Boot Up Floppy Seek:        Disabled
                    Boot Up Num Lock Status:    Off
                    Typematic Rate Setting:     Disabled
```

INSTALLATION PROCEDURE (continued)

Typematic Rate (Char/Sec):	6
Typematic Delay (mSec):	250
Security Option:	Setup
PCI/VGA Palette Snoop:	Disabled
OS Select of DRAM>64 Mbytes:	Non-OS2
HDD S.M.A.R.T. Capability:	Enabled
Processor Serial Number	Disabled

Chip Set Features Setup

SDRAM RAS to CAS Delay:	3
SDRAM RAS to CAS Delay:	3
SDRAM RAS to CAS Delay:	3
SDRAM Pre-charge Control:	Disabled
DRAM Data Integrity Mode:	ECC
System BIOS Cacheable:	Enabled
Video BIOS Shadow:	Disabled
Video RAM Cacheable:	Disabled
8 Bit I/O Recovery Time:	3
16 Bit I/O Recovery Time:	2
Memory Hole at 15M to 16M:	Disabled
PCI 2.1 Compliance:	Enabled
AGP Graphics Aperture	64 MB
CPU/PCI Clock (MHz):	Default
Spread Spectrum:	Disabled

Power Management Setup

ACPI Function:	Disabled
Power Management:	Disabled
PM Controlled by APM:	No
Video Off Method:	DPMS
Video Off After:	Suspend
Modem Use IRQ:	NA
Standby Mode:	Disabled
Suspend Mode:	Disabled
HDD Power down:	Disabled
VGA Active Monitor:	Disabled
Soft-Off by PWR-BTTN:	Instant-Off
PWR Lost Resume State:	Turn On
Resume on Ring:	Disabled
Resume on LAN:	Disabled
Resume on Alarm:	Disabled

PCI/Plug and Play Configuration

Resources Controlled By:	Manual
Reset Configuration Data:	Disabled
IRQ-3 Assigned to:	Legacy ISA
IRQ-4 Assigned to:	Legacy ISA
IRQ-5 Assigned to:	PCI/ISA PnP
IRQ-7 Assigned to:	Legacy ISA
IRQ-9 Assigned to:	Legacy ISA
IRQ-10 Assigned to:	PCI/ISA PnP

```
                        IRQ-11 Assigned to:          Legacy ISA
                        IRQ-12 Assigned to:          PCI/ISA PnP
                        IRQ-14 Assigned to:          PCI/ISA PnP
                        IRQ-15 Assigned to:          PCI/ISA PnP
                        DMA-0 Assigned to:           PCI/ISA PnP
                        DMA-1 Assigned to:           PCI/ISA PnP
                        DMA-3 Assigned to:           PCI/ISA PnP
                        DMA-5 Assigned to:           PCI/ISA PnP
                        DMA-6 Assigned to:           PCI/ISA PnP
                        DMA-7 Assigned to:           PCI/ISA PnP
                        Assign IRQ for VGA:          Disabled
                        Assign IRQ to USB:           Disabled
                        PCI Slot 1 Use IRQ:          Auto
                        PCI Slot 2 Use IRQ:          5
                        PCI Slot 3 Use IRQ:          Auto
                        PCI Slot 4 Use IRQ:          10
                        Used MEM Base Address:       N/A

Integrated Peripherals
                        IDE HDD Block Mode:          Enabled
                        IDE Primary Master PIO:      Auto
                        IDE Primary Slave:           Auto
                        IDE Primary Master UDMA:     Auto
                        IDE Primary Slave UDMA:      Auto
                        IDE Secondary Master UDMA:   Auto
                        IDE Secondary Slave UDMA:    Auto
                        On-Chip Primary PCI IDE:     Enabled
                        On-Chip Secondary PCI IDE:   Disabled
                        USB Keyboard Support:        Disabled
                        Init Display on First:       PCI slot
                        KBC Input Clock:             8 MHz
                        Onboard FDC Controller:      Enabled
                        Onboard Serial Port1:        3F8/IRQ4
                        Onboard Serial Port1:        2F8/IRQ3
                        UART 2 Mode:                 Normal
                        Onboard Parallel Port:       378/IRQ7
                        Parallel Port Mode:          SPP
                        Keyboard/Mouse Power On:     Disabled
```

Select <F10> to save and exit the system BIOS.

Select <Enter> to reboot the system.

Select <Enter> when prompted for the date and time.

82. Verify that the power-up self test is successfully completed.
83. Disconnect the keyboard from the cockpit DIN connector.
84. Enter the Setup menu and verify that time and date settings are correct.
85. Enter the Service menu and verify that next PM due date is correct.
86. Perform the PMC Procedure given in Section 6.0.

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Dräger MEDICAL

ATTACHMENT 1

FIELD CORRECTION REPORT
700 MHZ MOTHERBOARD PCB

After each motherboard exchange is completed the account demographics, machine's serial number, WPU serial number, WPU part number, motherboard serial number removed, motherboard serial number installed shall be entered on the report. A Technician signature, ID# and date are also required on each report. This form shall be completely filled out and placed in the return motherboard shipping carton.
(Attention: DMI Receiving Department please forward to Service/Ken Horsfield)

Hospital Name: _____

Street Address: _____

City & State: _____

Zip Code: _____

Machine serial number: _____

WPU part number, (printed on S/N label): _____

WPU serial number: _____

Removed; Motherboard serial number: _____

Installed; Motherboard serial number: _____

TECHNICAN:	**I.D. #**	**DATE:**

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